

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2
--	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	---

FOR : METHOD OF MANUFACTURING PART  
FOR OPTICAL FIBER CONNECTOR

A method of manufacturing a ferrule includes the steps of electroforming on a metallic wire used as a mother mold to produce an elongated

cylindrical rod, by providing grooves on the circumferential surface of the rod, breaking the groove portion and drawing the wire, and machining the rod with respect to at least length and size (diameter), such that the method omits the step of sealing the wire with an electric insulator and an elongated electroformed rod can be manufactured and variation in sizes of diameter and off-center failure are decreased.

**IN THE SPECIFICATION:**

Note: The following amendments to do not count blank lines.

Page 2, cancel the paragraph at lines 13-24, and in place thereof, insert the following new paragraph:

More specifically, in the drawing method comprising the steps of using a wire such as a metallic wire or the like as a mother mold, and drawing the wire after electroforming on the mother mold wire, since the tensile strength of the wire is insufficient and the drawing resistance is high, the drawing is performed only to a length of about 30 to 100 mm of the length. To make the electroformed portion 5 into a rod as long as possible is very important for an improvement in productivity of the electroforming.

As a result, the method using electric insulators was reluctantly adopted. However, the following problems arose.

Page 3, line 21 - Page 4, line 1, cancel the paragraph, and in place thereof, insert the following new paragraph:

Taking the above-mentioned problems into consideration, in a method of manufacturing a ferrule wherein electroforming is carried out using a wire such as a metallic wire or the like as a mother mold, and after drawing the wire, machining the obtained electroformed article, the object of the present invention is to provide a method by which an electroformed article having the longest possible length and a small variation in the size of diameters without the step of sealing an electric insulator.

Page 4, cancel the paragraph at lines 16-18, and in place thereof, insert the following new paragraphs:

Fig. 1(a)(1) is a cross-sectional view of a part for an optical fiber connector according to a conventional method;

Fig. 1(a)(2) is a side elevational view of the optical fiber connector of Fig. 1(a)(1);

Fig. 1(b)(1) is a cross-sectional view of a part for an optical fiber connector according to another conventional method;

Fig. 1(b)(2) is a side elevational view of the optical fiber connector of Fig. 1(b)(1);

Page 5, cancel the paragraph at lines 6-8, and in place thereof, insert the following new paragraphs:

Fig. 7(a) is a side view showing one example of a supporting jig according to the present invention;

Fig. 7(b) is a plan view of the supporting jig of Fig. 7(a); and

Page 5, cancel the paragraph at lines 15-19, and in place thereof, insert the following new paragraph:

An electroforming device is schematically shown in Fig. 6. In Fig. 6, the electroforming device comprises an electroforming liquid 8, a positive electrode 9, a supporting jig 10, an air stirring nozzle 11, a spring 12, a negative electrode 13, and a wire 3.

Page 7, line 18 - Page 8, line 3, cancel the paragraph, and in place thereof, insert the following new paragraph:

Alternatively, in the case of two- or multi-core type, high accuracy is required as described above. Thus, a wire having a cross-sectional shape other than a circular cross-section may be used as shown in Figs. 8(a) to 8(g). That is, in Fig. 8, the type of (a) is an oval wire, which is a two-core type, the type of (b) is a triangular wire with a round portion in each corner, which is a three-core type, the type of (c) is a square wire with a round portion in each corner, which is a four-core type, the type of (d) is a rectangular wire with a round portion in each corner, which is a five-core type, the type of (e) is a rectangular wire with a round portion in each corner, which is a six-core type, the type of (f) is a hexagonal wire with a round portion in each corner, which is a seven-core type, and the type of (g) is a rectangular wire with a four-core type. However, in Figs. 8(a) to 8(f), round portions may not be provided in corners. When these wires are used, the same method as in the case of a one-core type can be utilized.

Page 10, line 2 - Page 11, line 1, cancel the paragraph, and in place thereof, insert the following new paragraph:

FD-302 (Rev. 4-15-64)

An example of the present invention will be described below. A SUS 304 wire having a circular cross-section and a diameter of 0.126 mm was prepared, and the wire was set at an electroforming jig with the wire stretched by the elasticity of a spring as shown in Fig. 6. After rinsing the wire, the wire was electrolytically degreased and rinsed. After the wire was immersed in an aqueous solution of Nikka Non-tack A and B mixed liquid produced by Nippon Chemical Industry Co. Ltd., at an ordinary room temperature for 10 minutes and mold releasing processing was performed. After that the wire was rinsed well. On the other hand, the following tank was prepared. That is, four anodes of nickel spheres in titanium net contained in a polyester bag were provided in an electroforming liquid principally containing nickel sulfamate and in the four corners of the tank. The wire was placed substantially at the center of the four anodes. The electroforming liquid was filtered with 1  $\mu$ m filtration precision at high speed and heated the tank at  $50 \pm 2^{\circ}\text{C}$ . Then, they were set as shown in Fig. 6, and the wire was used as a cathode and nickel spheres were used as anodes. Electroforming was performed one day at a current

density of about 4 to 6 A/dm<sup>2</sup> and a nickel electroformed article (rod) having an average diameter of 2.5 mm and a length of about 250 mm resulted. Then, cutting grooves were prepared on the surface of the electroformed article at intervals of about 50 mm with a polishing machine. This groove portion was bent and broken and the wire was easily drawn. Then, the electroformed article was machined or ground to a diameter of 2.00 mm and a length of 8.00 mm with an NC . auto-turning machine, a centerless machine or the like to obtain a finished product. The products manufactured this way were problem free.

**IN THE CLAIMS:**

Amend claim 1 and add new claims 5 and 6, as follows:

1. (Amended) A method of manufacturing a part for an optical fiber connector, the method comprising the steps of:
  - electroforming on a wire used as a mother mold with the wire stretched to make the wire into a rod,
  - 5 forming grooves on the rod at intervals to form groove portions,
  - breaking the groove portions,
  - drawing the wire, and
  - machining the rod to adjust at least a length and
  - 10 diameter of the rod.

Add the following new claims:

5. (New) The method of manufacturing a part for an optical fiber connector according to claim 1, wherein the wire is made from metal.

6. (New) The method of manufacturing a part for an optical fiber connector according to claim 1, wherein the wire is made from plastic.

TOP SECRET 456559



R E M A R K S

Claims 1-6 are now in this application, and are presented for the Examiner's consideration.

The Abstract has been amended in order to correct various errors and to eliminate legal terms. A marked-up copy of the amended portions of the Abstract is provided at the end of this Preliminary Amendment. A clean copy of the amended Abstract is also provided at the end of this Preliminary Amendment on a separate sheet.

The specification has been amended in order to correct various errors. A marked-up copy of the amended portions of the specification is provided at the end of this Preliminary Amendment.

The claims have also been amended in order to provide proper antecedent basis, and to positively recite the steps. A marked-up copy of the amended claims is provided at the end of this Preliminary Amendment.

In addition, Figs. 1(a), 1(b), 6 and 7 have been amended, as indicated in red on the attached copies herewith.

Specifically, Fig. 1(a) has been separated into Figs. 1(a)(1) and 1(a)(2), Fig. 1(b) has been separated into Figs. 1(b)(1) and 1(b)(2), numeral 9 has been added to refer to the positive electrode in Fig. 6, and Fig. 7 has been separated into Figs. 7(a) and 7(b).

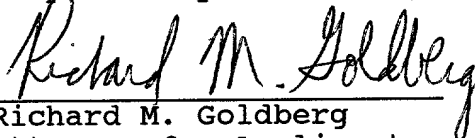
The Examiner is requested to approve these drawing changes.

A separate letter to the Official Draftsman is also enclosed.

Please charge any additional fees incurred by this Preliminary Amendment, or credit any overpayment, to Deposit Account No. 07-1524.

It is hoped that this Preliminary Amendment will facilitate an examination of the application on its merits.

Respectfully submitted,

  
Richard M. Goldberg  
Attorney for Applicant  
Registration No. 28,215

25 East Salem Street  
Suite 419  
Hackensack, New Jersey 07601  
TEL (201) 343-7775  
FAX (201) 488-3884

Enclosures: MARKED-UP AMENDMENTS TO ABSTRACT  
CLEAN COPY OF AMENDED ABSTRACT ON A SEPARATE SHEET  
MARKED-UP COPY OF SPECIFICATION AMENDMENTS  
MARKED-UP COPY OF AMENDED CLAIMS  
LETTER TO OFFICIAL DRAFTSMAN and marked up  
copies of Figs. 1(a), 1(b), 6 and 7

MARKED-UP AMENDMENTS TO ABSTRACT

Page 13, cancel the paragraphs on the entire page, and in place thereof, insert the following new paragraphs:

ABSTRACT OF THE DISCLOSURE

A method of manufacturing a ferrule [comprising] includes the steps of electroforming on a [wire such as a] metallic wire used as a mother mold to produce an elongated cylindrical rod, by providing grooves [7] on the circumferential surface of the rod, breaking the groove portion and drawing the wire, and machining the rod with respect to at least length and size (diameter), such that the method omits[. An object of the present invention is to provide a method of manufacturing a ferrule that can improve productivity and quality by omitting] the step of sealing the wire with an electric insulator [or the like whereby] and an elongated electroformed rod can be manufactured and variation in sizes of diameter and off-center failure are decreased.

MARKED-UP COPY OF SPECIFICATION AMENDMENTS

Page 2, cancel the paragraph at lines 13-24, and in place thereof, insert the following new paragraph:

More specifically, in the drawing method comprising the steps of using a wire such as a metallic wire or the like as a mother mold, and drawing the wire after electroforming on the mother mold wire, since the tensile strength of the wire is insufficient and the drawing resistance is high, the drawing is [not] performed only to a length of about 30 to 100 mm of the length. To make the electroformed portion 5 into a rod as long as possible is very important for an improvement in productivity of the electroforming. As a result, the method using electric insulators was reluctantly adopted. However, the following problems arose.

Page 3, line 21 - Page 4, line 1, cancel the paragraph, and in place thereof, insert the following new paragraph:

Taking the above-mentioned problems into consideration, in a method of [manufacturing] manufacturing a ferrule wherein electroforming is carried out using a wire such as a metallic wire or the like as a mother mold, and after drawing the wire, machining the obtained electroformed article, the object of the present invention is to

provide a method by which an electroformed article having the longest possible length and a small variation in the size of diameters without the step of sealing an electric insulator.

Page 4, cancel the paragraph at lines 16-18, and in place thereof, insert the following new paragraphs:

Fig. 1(a)(1) is [and Fig. 1(b) are] a cross-sectional view [and a side view] of a part for an optical fiber connector according to a conventional method;

Fig. 1(a)(2) is a side elevational view of the optical fiber connector of Fig. 1(a)(1);

Fig. 2(a)(1) is a cross-sectional view of a part for an optical fiber connector according to another conventional method;

Fig. 2(a)(2) is a side elevational view of the optical fiber connector of Fig. 2(a)(1);

Page 5, cancel the paragraph at lines 6-8, and in place thereof, insert the following new paragraphs:

Fig. 7(a) is a side view [and a plan view] showing one example of a supporting jig according to the present invention;

Fig. 7(b) is a plan view of the supporting jig of Fig. 7(a)(1); and

Page 5, cancel the paragraph at lines 15-19, and in place thereof, insert the following new paragraph:

An electroforming device is schematically shown in Fig. 6. In Fig. 6, the electroforming device comprises an electroforming liquid 8, a positive electrode 9, a supporting jig 10, an air stirring nozzle 11, a spring 12, a negative electrode 13, and a wire [13] 3.

Page 7, line 18 - Page 8, line 3, cancel the paragraph, and in place thereof, insert the following new paragraph:

Alternatively, in the case of two- or multi-core type, high accuracy is required as described above. Thus, a wire having a cross-sectional shape other than a circular cross-section may be used as shown in Figs. 8(a) to 8(g). That is, in Fig. 8, the type of (a) is an oval wire, which is a two-core type, the type of (b) is a triangular wire with a round portion in each corner, which is a three-core type, the type of (c) is a square wire with a round portion in each corner, which is a four-core type, the type of (d) is a rectangular wire with a round portion in each corner, which is a five-core type, the type of (e) is a rectangular wire with a round portion in each corner, which is a six-core type, the type of (f) is a hexagonal [rectangular] wire with a round portion in each

corner, which is a seven-core type, and the type of (g) is a rectangular wire with a four-core type. However, in Figs. 8(a) to 8(f), round portions may not be provided in corners. When these wires are used, the same method as in the case of a one-core type can be utilized.

Page 10, line 2 - Page 11, line 1, cancel the paragraph, and in place thereof, insert the following new paragraph:

An example of the present invention will be described below. A SUS 304 wire having a circular cross-section and a diameter of 0.126 mm was prepared, and the wire was set at an electroforming jig with the wire stretched by the elasticity of a spring as shown in Fig. 6. After rinsing the wire, the wire was [electrolytically] electrolytically degreased and rinsed. After the wire was immersed in an aqueous solution of Nikka Non-tack A and B mixed liquid produced by Nippon Chemical Industry Co. Ltd., at an ordinary room temperature for 10 minutes and mold releasing processing was performed. After that the wire was rinsed well. On the other hand, the following tank was prepared. That is, four anodes of nickel spheres in titanium net contained in a polyester bag were provided in an electroforming liquid principally containing nickel sulfamate and in the

four corners of the tank. The wire was placed substantially at the center of the four anodes. The electroforming liquid was filtered with 1  $\mu\text{m}$  filtration precision at high speed and heated the tank at  $50 \pm 2^\circ\text{C}$ . Then, they were set as shown in Fig. 6, and the wire was used as a cathode and nickel spheres were used as anodes.

Electroforming was performed one day at a current density of about 4 to 6  $\text{A}/\text{dm}^2$  and a nickel electroformed article (rod) having an average diameter of 2.5 mm and a length of about 250 mm resulted. Then, cutting grooves were prepared on the surface of the electroformed article at intervals of about 50 mm with a polishing machine. This groove portion was bent and broken and the wire was easily drawn. Then, the electroformed article was machined or ground to a diameter of 2.00 mm and a length of 8.00 mm with an NC . auto-turning machine, a centerless machine or the like to obtain a finished product. The products manufactured this way were problem free.



MARKED-UP COPY OF AMENDED CLAIMS

Amend claim 1 and add new claims 5 and 6, as follows:

1. (Amended) A method of manufacturing a part for an optical fiber connector, the method comprising the steps of:

5 electroforming on a [metallic or plastic] wire used as a mother mold with the wire stretched to make the wire into a rod,

forming grooves on the rod at intervals to form groove portions,

breaking the groove portions,

10 drawing the wire, and

machining the rod to adjust at least [the] a length and diameter of the rod.

Add the following new claims:

5. (New) The method of manufacturing a part for an optical fiber connector according to claim 1, wherein the wire is made from metal.

6. (New) The method of manufacturing a part for an optical fiber connector according to claim 1, wherein the wire is made from plastic.

## ABSTRACT OF THE DISCLOSURE

A method of manufacturing a ferrule includes the steps of electroforming on a metallic wire used as a mother mold to produce an elongated cylindrical rod, by providing grooves on the circumferential surface of the rod, breaking the groove portion and drawing the wire, and machining the rod with respect to at least length and size (diameter), such that the method omits the step of sealing the wire with an electric insulator and an elongated electroformed rod can be manufactured and variation in sizes of diameter and off-center failure are decreased.

FIG. 1(a)(2)

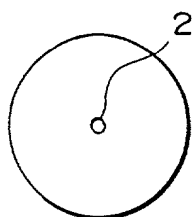


FIG. 1(a)(1)

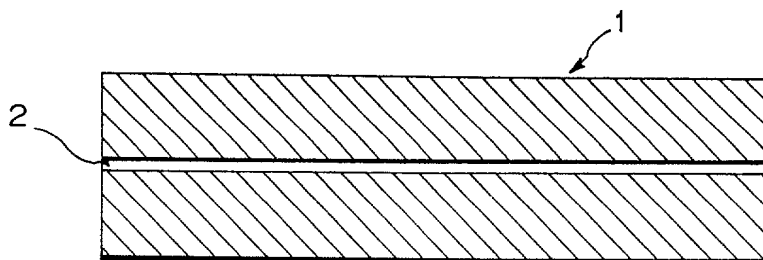


FIG. 1(b)(2)

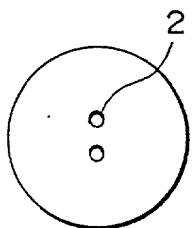


FIG. 1(b)(1)

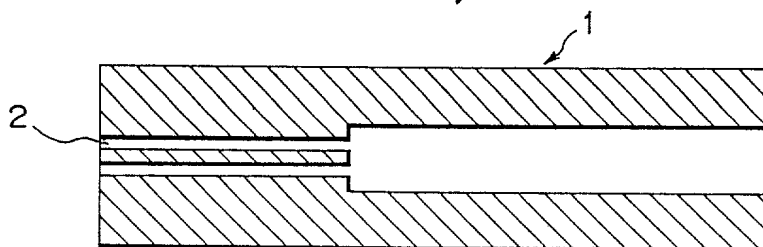


FIG. 2



40674-4526660

FIG. 6

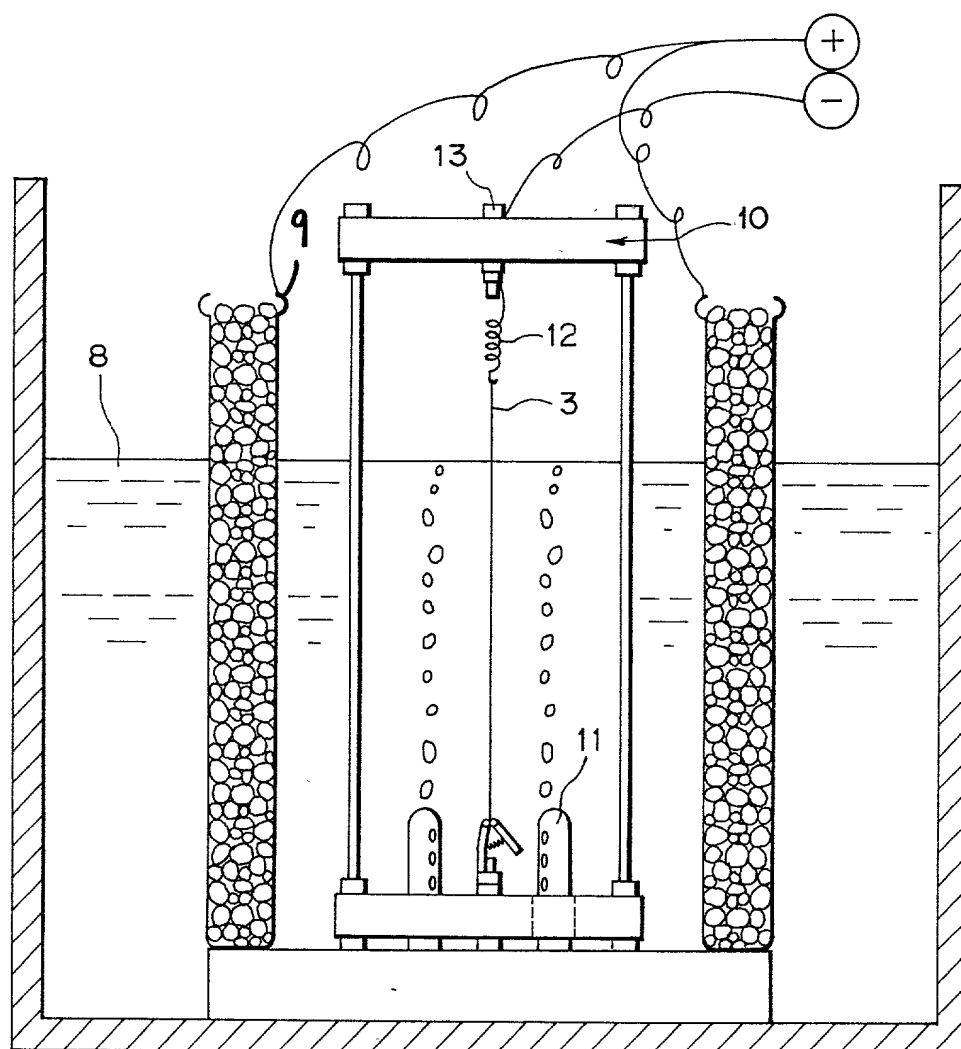


FIG. 7(a)

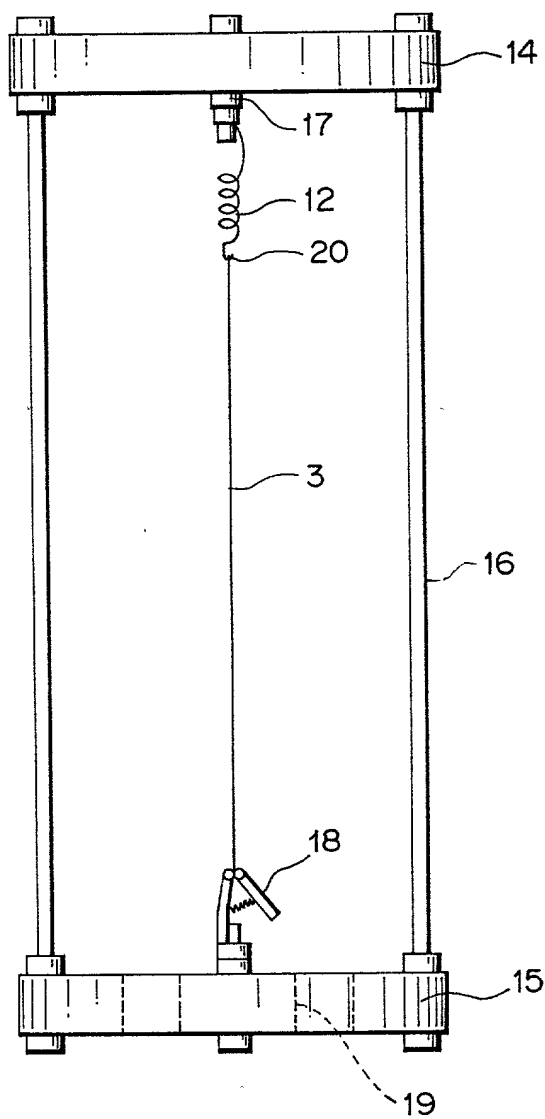


FIG. 7(b)

